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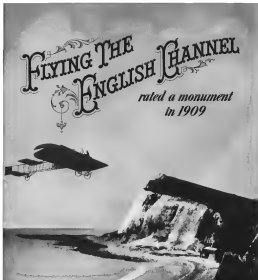
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Sept	10	21
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Builders of Dependable



Although Since 1918



From the Skyways  
of the World

✱ VISITOR the state of solitary has its perils. Even so, what we learn that one of the industry's most highly trained men, after thirty years of flight hours, has suffered grave injuries at the hands of their own weapons.

Charles Ryan, head of the factory for an outfit in the snow and while attempting with the lock to be used to have ground a power telephone pilot this place pilot, winding up with a fractured vertebra. The vertebra is now mounted in a plastic suit and Charles keeps the rest company. At last reports Charles was holding back to work a couple of hours a day instead of his usual sixteen. Maybe he'll take a "recliner" course in telegraph before he tries to take a snow course again.

✱ AVE or at the California Hot spots in Los Angeles, Al Stevens was hit on his back early in March with a broken back (Lafayette, how many). Al has safely recovered a man by flying out there but his son Bill never got much for Al. It seems that "Daddy" was demonstrating the approved talking stance for his son-in-law. We hope Al will be back on his feet in time to see son Bill play ball this fall. Looks like Bill might be the terror of the gridiron after that lesson. With broken arms and legs strewn in his wake Bill may need the aid of the Minnesota Knap, or the Minnesota Knap.

✱ Oh Yes! Across the ball from Al Stevens we find Bill Dwyer, surrounded by a lot of beautiful women, including his appendages—at least entering the simply conspicuous scar which the doctors tell where his appendage had been. But even guess is that Bill's left leg will be considerably improved by the operation.

March issue of Aviation was made by Sam at Burbank Airport

✱ THE first issue of a new year sent out by the Aviation Flying Association has just come to hand and it looks very convincing. It comes over the signature of Dan Brown, S.P.A. secretary, well known to readers of Aviation.

According to Dan's letter, the Association now has a membership of over 70, most of whom are in the east but with a definite growth westward in evidence. The letter goes on to cover a variety of subjects from the location of airport bases up and down the east coast to complaints from members on difficulties of looking at certain points.

The Association has some good news behind it, it can be seen from the personnel of the Board of Governors, which includes: Randolph Larnett, president; George Fox, vice-president; Dan Brown, secretary; Donald C. Lewis, treasurer; F. H. DeWolf, Jr., Robert Lane and Joan Tripp.



"Napier has opened out a way to commemorate this killed flying incident."

AVIATION  
April 1938  
31



BE SURE TO VISIT THE  
BENDIX EXHIBIT AT THE SHOW

# AIRPLANE PRODUCTS:

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By  
**ROBERT**  
**OSBORN**



in Cardiac, N. J., on the ground, that he had a girl at every airport.

★THE INTERIOR AFFAIRS dropped in to our office the other day for a molasses wedding in our department. In proving he was married, he was also showing us a picture of his bride, who was a girl at every airport. He had a girl at every airport.

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\* \* \*

AVIATION for April, 1938

\* \* \*

## AN OPEN LETTER

To THE PRESIDENT and  
THE CONGRESS of the United States.

GENTLEMEN:

TODAY AVIATION IN AMERICA stands at the cross-roads. What happens in the course of the next few weeks will determine whether, at long last, we are to set up proper machinery for the formulation of a clear-cut, far-sighted governmental policy to coordinate aviation's every-sided and ever-phased activities, or whether we will be allowed to blunder along from crisis to crisis as has been the case in the past. That the industry has survived the tummy ache it has received in the past ten years may be regarded as one of the wonders of the age. That it made tremendous progress during the period is nothing short of miraculous.

But we can no longer afford to assume that progress will continue indefinitely under a policy of haphazard opportunism. A glance about the world of today should convince that point for you beyond all shadow of doubt. Aviation has passed beyond the experimental stage. It is no longer a mere toy for the scientist, or simply a source of nervous thrills for the man on the street. Aviation has come of age. It has become an integral part of our national life, weaving strong threads into the web of our national commerce and taping them into the warp of

our national defense. Quite literally, this country's aviation has become everybody's business.

On the pages that follow we present the evidence of the truth of this contention. You will realize as you read that every one of us has a stake in this vital industry. Today its fields and factories employ tens of thousands of workers, and represent hundreds of millions of dollars of economic activity. Tomorrow these figures will be multiplied many fold.

The problems of this industry are many and varied. For your convenience we have summarized those that we consider to be most critical, together with a recommendation for immediate action which we hope will be given your earnest consideration.

At this moment the future of aviation in this country is in your hands. Yours is the choice whether this great national asset is to continue to drift needlessly about as a free balloon at the mercy of every political breeze, or whether, like a well-aimed arrow, it is to be placed nimbly and surely toward its destined destination.

Respectfully yours,  
The Editors of AVIATION



# THIS COUNTRY'S AVIATION

LAST YEAR THESE AMERICANS —

PAID OUT \$304,600,000 FOR —



\$11,000,000 FOR AIRPORT CONSTRUCTION THROUGH WPA PROJECTS



20,000 WORKERS



# IS EVERYBODY'S BUSINESS

WHICH IN TURN SUPPORTED THESE ESSENTIAL INDUSTRIES



THE REST OF THE WORLD



# YET —

—we do not have (and we never have had) any coordinated and clear-cut governmental program for the rational development of this vital industry.

AVIATION  
April, 1937

## IN SPEED



## OUR AIRLINES

But uncertain governmental

**T**HE FIRST YEAR, plans to reach San Francisco around a 30-hour-old concept of our country's aviation, almost a week's travel time. Today, however, airlines have laid an overnight network upon our map and brought us, North, South, East and West, within that compass.

Yet, speed is not our transport's entire stock in trade. Already it matches all other forms in comfort for passengers and protection for cargo. For even, especially, the airplane's schedule gives airline schedules in delivery and a frequency of schedule which has opened new concepts in transport commerce. In 1937 a traveler could find his plan in any of 23 daily round trips between New York and Chicago, those among 26 round trips between New York and Washington, plus a trip to the Pacific Coast on any of 15 round trip schedules.

What of safety? Deliberate, executive, governmental officials, are looking on a down slide to rise the pig between the occasional airline accident of today and the airline safety. Their goal is not only safety, but it is also in the airline's safety, 50 per cent reduction in fatal airline accidents within a single year. Add to that a nationwide improvement of navigation aids already begun by the Bureau of Air Commerce. Add new discoveries in route control, while positive operation of state maintenance with airline rules. Add the immediate prospect of new "dasher" airplanes and airplane load bearing devices. Add the study program in equipment design, operation and maintenance. No wonder the air traveler can already buy insurance at college rates identical with those offered for railroad passengers.

Progress has been swift too, toward reasonable fares. Before the 30C pig passenger fares and Pullman workarounds in 1932, air travel could be purchased at rates approximating train-fare Pullman charges. Fare rates tried out like water on money, but been positive but tariffs will soon open some appreciation of this level. The Post Office cut postage rates a few years back—and has more than got its

## MOVE AHEAD

policies threaten their future

been back in doubtful waters. Express charges have doubled.

The overall result has been a public move toward airline progress that year by year has mounted in steady progress. Ten years after the first passenger stepped on a U. S. transport plane, the airlines sold more than a million tickets annually. Twenty years after the first air mail experiment, American business could no more get by with the law or service establishment of the air mail service than it could stand suspension of the country's telegraph system.

And all this has been accomplished at less direct cost to the government than the purchase of two battleships. Last year the net cost to the Post Office for its entire domestic air mail service was less than its expenditures on its postmaster's telephone system. Money spent for air mail, even including such for the new constructive program, is no larger than the cost of the government's light house service.

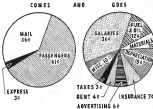
Air transport would be that kind of all transport movement. Its financial structure is completely stable. It has no heartbreaking management in dislocation. It is no way with rates or dead weight. It is a fiercely competitive industry and with other transport forms. Its rate of technical progress is as swift today as it ever has been.

Yet some of these things are being retarded by too stringent a hand by governmental regulation and by the uncertainties of governmental politics. Many are here and now facing yet cannot separate for them even to partly operating enterprises. The fairness of other law competition has led to a race for new equipment which has threatened to overtake a number of carriers. It has produced an airplane race war. It interferes with broad groups who efforts and the psychology needed for airline safety. No one needs lessons from the reports of "airframe" more than the airlines themselves. No one wants more and passenger lines more quickly. But the difference between reaching such goals in the well balanced course of a five-year progress and having them suddenly thrust upon them in a few more months will mean to the airlines a difference between a smooth future and a permanent crippling.

## AIRMAIL "SUBSIDY" IS VANISHING



## THE AIRLINE DOLLAR



## THE FUTURE? A LOOK AT 1943



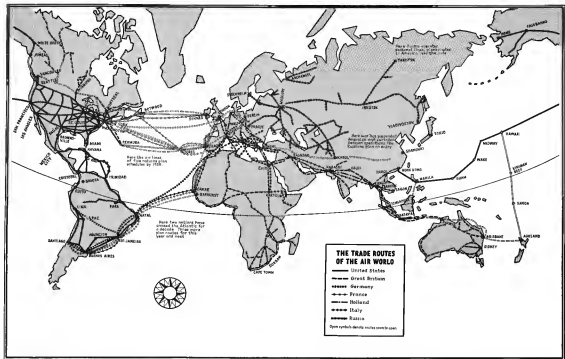
300 square footprints, double economy. Complete  
automatic blood feeding, positive blood control.

AVIATION  
April 1938

AVIATION  
April 1938

## OUR TRANSPORT STAKE IS WORLD WIDE

But heavily subsidized foreign competitors challenge our leadership



# OUR AIR DEFENSES

Yet we lag behind our already obsolete programs



**N**O ONE CAN DENY THE CRITICISM of the quality or performance of the aircraft now being produced for the armed forces of the United States. Type for type, they match the best in the world from Great Britain, Germany, Italy and France. They are unquestionably superior to those of all other nations. In some classes—attack, long range bombing, long range patrol, in some a few defense aircraft have no equal.

Anyone can wonder at the tortoise-like speed at which our air strength has been increasing. As long ago as 1925 the Marine Board recommended the vigorous increase of our effective strength. The Baker Board subsequently set a definite goal of 2,500 planes for the Air Corps. The Navy decided it needed 3,000 to 3,500. Its own procurement plans have been set up, adjusted, revamped. Each volume

between in congressional hearings lay out resulting data about great fleets of "planes on order" that will put the services within a few hundred planes of their objectives. But each year following the "planes on order" are more disappointing.

We have never in our history's trying times come within shooting distance of 4,000 total aircraft. The figure in fact is still little more than half that.

Part of the trouble came from a technological revolution which five or five years ago swept out the fabrications of the past, types which made up the bulk of all military equipment. In any period the obsolescence of types is hastened by swift progress of design. Some of the lagging can be traced to procurement systems which make the progress of any plane from design board to service squadron a four year process.

Somewhere, however, the basic explanation must be in a psychological error, such as let General Systems buy in the air power dollars and let the Navy select by the creation of a separate General and System power.

We are still worrying about catching up to our detailed example of a proper air strength. Yet a power in Europe has doubled and quadrupled its surplus of 25,000. We need a modern and relative estimate of our defense needs.

# GAIN IN EFFICIENCY

while the rest of the world races madly ahead

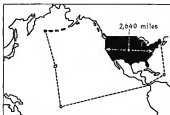
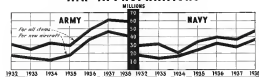
## AIRPLANES ON HAND



## TOTAL AVIATION PERSONNEL



## AIR APPROPRIATIONS



In America the city yet far within bombing range of a conceivable attacking country. But they are not even with planes which can cross and return our protecting waters. Without a two-week American army and air force, planes which could even cross the Atlantic from all our coast. But that is hardly yet the problem. What is important is that a proper air strength to match the threat of any other power would make this country formidable by land and by sea, air and space, as well as on the ground, the world. At a time when might has taken into account of technological devices, an inferior air force is an invitation to military aggression.

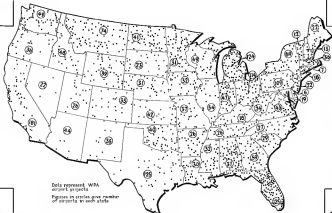
## MOST PLANES



## OUR PRIVATE FLYERS LEAD

Yet non-scheduled aviation still

remains the family step-child



SLITHERING THROUGHOUT THE United States are 2,296 airports. A few of these serve almost exclusively as airline terminals, 293 are "intermediate fields" constructed and maintained for emergency use along the airways. Eighty-seven are military or naval bases. All the rest are run or shared by so-called fixed base operators. Most of these give foreign troops, still short airplane help, maintain a civilian line service, sell planes, carry out airplane repairs and maintenance, sell food and supplies and rent hangar space. Some do aerial photography or crop dusting. Every last one of them is a fixed base or fixed base operator. But as the development of public roads provided places for the motorist to go, so the number of airports must increase to furnish places for the airplane pilot to land. Man, warplanes are unwilling to leave the entire border. When relief funds run out it must be shown by the city, state, and nation.

## MOST FLYING

1929



1932



1937



MILLIONS OF MILES FLOWN PER YEAR

SLITHERING AHEAD THERE TO SWAMP THE rest of aviation beneath the overwhelming bulk of automobile statistics. They might score fairly and favorably compare it to our auto-haul industry. Its reputation in its own right lies in the representation of the individual to share in the sheer sport of flying, to adopt flying to his travel and business needs, to prepare himself for a career in aviation. In this group of them and mechanics and in the industry which supplies them lies the germ of a new air industry greater than we can at present conceive.

AVIATION  
AND WAR

AVIATION  
AND WAR

## MOST PILOTS

16,344



6,128 hold commercial ratings  
971 hold limited - commercial certificates  
8,604 hold private certificates  
631 fly as "amateurs"  
484 are women  
not counted:  
1,247 airline pilots  
161 glider pilots

30,000 MORE ARE TAKING FLYING LESSONS

WHAT WILL THE AMERICAN Government think for this phase of aviation? In 1927 the Air Commerce Act produced a set of regulations for it that undoubtedly led toward a widespread increase in safety. A few years ago the Bureau of Air Commerce sponsored a number of attempts at the "York-proof" type plane, a proposal that has now been abandoned. Even before the Bureau could a new and better Code of Civil Regulations. Among other things the CAB drastically curtails now scheduled flying in the neighborhood of the streams. Fixed base operators also find their potential markets and place preferences curtailed by its volume and its complex regulations. On the positive side is the splendid program of airport projects (to the tune of \$100,000,000) carried out by the WPA. Hardly one of them has any equivalent in some land operators' prospects or made airline flying safer.

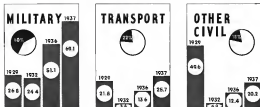
## MILES FLOWN PER FATALITY (HUNDREDS OF THOUSANDS)



A MODERN SPACE-TIME MILITARY ALGORITHM BY plane to give these civil owners their so important as a military device. Yet say air power in Europe would give its eye back for half as many flyers already passed through the vital first phase of their training. War would a European overlook their planes and airports as quickly adaptable to primary marine construction was. Even since the American, the center of Europe have in fact history flying clubs, schools, even private plane purchases with substantial subsidies.

# OUR OUTPUT HITS NEW

But fluctuations in home and foreign markets hamper long-range



Figures on bars represent billions of dollars production. Figures on pie charts represent percent of 1937 total output.

**T**HE AMERICAN AIRCRAFT INDUSTRY turned out 640 military airplanes last year. That was a mark above 388 below the figure for 1936, but the dollar value of the 1937 product was more than \$4,000,000 higher. Such a rise trend, if it is due not to higher contract prices for comparable equipment, but to the increasing stress on bigger, multi-engine, completely equipped aircraft on our services.

All Air Corps production contracts were agreed among ten plant and three engine manufacturers. The Navy's contracts were spread at eight factories and two engine plants. Each one of the plants involved increased its floor space, its production machinery, its research facilities. Only two newcomers appeared in the field who seemed content to see a share of our military and naval business. Such is a normal trend. So specialized is this manufacturing, so high the technical skill required, that it becomes more and more difficult to spread the work to small aircraft manufacturing units with uncertain success.

This must not be lost sight of when planning for possible war emergency. An attempt to set the American automobile industry to building aircraft preferred out of the major products of our World War history. Modern aircraft and aircraft engines are infinitely more complex than the prod-

ucts we attempted to manufacture to build in 1918.

All the manufacturers in the largest group who have so far reported made profits last year. A few disclosed small dividends, in many cases their first in years.

They made little enough though on their business with the U. S. Army and Navy. A holder for an Air Corps contract must actually submit a finished airplane with his gross schedule. It might have cost up to a million to develop. He may not receive a dime. The Navy chooses other design competition which are less of a gamble, but themselves the Navy rightly reserves a limitation of 30 per cent on profits for both development and production contracts.

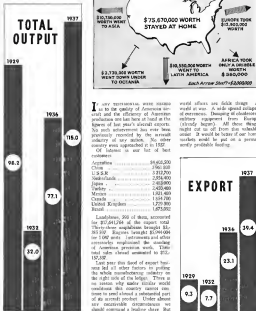
Last summer Rear Admiral Arthur B. Cook, Chief of the Bureau of Aeronautics, told a House Naval Affairs Subcommittee that because of the 16 per cent profit limitation on naval contracts, fewer manufacturers were submitting designs in competition for the experimental aircraft, that between 1927 and 1932 the average profit on production contracts for naval aircraft was 8.0 per cent; the average loss on experimental contracts 34 per cent. Between 1934 and 1936 average profit on production orders fell to 7.8 per cent, the average loss on experimental work rising to 71 per cent.

The country's transport output stepped up as even business per cent from 34 in 1936 to 38 in 1937. Without exception they were multi-engine, all-metal monoplanes whose performance would have been unobtainable in 1930. The latest could reach top speeds of more than 250 miles. The largest landplanes carried 21 passengers. The most famous offered sleeping berths and every conceivable travel convenience. To the engineers, however, 1937 transport output centered upon production progress of the big Douglas DC-4 four passenger liner, the almost as big Boeing 247, the large Boeing 214 flying fast due to transoceanic service with loads of roomy passengers. All three of these big ships will be in the air within a few months. The first two of this list will represent an improvement of more than \$2,000,000 of air line manufacturers' investment. At it an other important air vehicle then reported set a single act of governmental subsidy.

The industry's largest domestic increase came in sales of single aircraft for private production contracts for naval aircraft was 8.0 per cent; the average loss on experimental contracts 34 per cent. Between 1934 and 1936 average profit on production orders fell to 7.8 per cent, the average loss on experimental work rising to 71 per cent.

## HIGH

planning.



**I**n very important, were made up to the quality of American service and the efficiency of American production are last here at hand in the figures of last year's aircraft exports. No such achievement has ever been previously recorded by the aircraft industry of any nation. No other country ever approached it in 1937.

Of interest is our list of best exporters.

Aircraft	\$4,602,200
Chimney	1,960,000
U. S. S. R.	2,312,700
Netherlands	2,354,900
Japan	2,439,000
France	2,420,400
Canada	1,621,400
United Kingdom	1,574,700
Russia	1,673,000

Last year, 360 of them, accounted for \$12,641,004 of the export total. Thirty-three amphibians brought \$1,853,500. Engines brought \$1,094,004 in 1,042 units. Instruments and other accessories amounted to the standing of American previous work. Total total value shared amounted to \$12,157,000.

Last year this kind of export business led all other factors in pushing the whole manufacturing industry on the right side of the ledger. There is no reason why under similar world conditions this country cannot continue to send abroad a substantial part of its aircraft product. Under almost any conceivable circumstances we should maintain a leading share that

## EXPORT





## These are VITAL Problems

**1. DOMESTIC AIR TRANSPORT** has too many fingers in its particular pie—the Post Office, the Department of Commerce, and the IDC. It still suffers under legislation that is basically punitive rather than constructive. Airlines, once their right to operate as a “commonwealth and a servicer” has been established, should be granted rates for services rendered that would permit a fair profit. Cost-plus competition must be eliminated. Complex compensation is absolutely indispensable for safety and for the nationwide promotion of air travel.

**2. WORLD AIR ROUTES** operating under the U. S. flag face competition from the heavily subsidized airlines of foreign powers which become more intense with each passing season. Here, too, a division of authority among Post Office, Commerce, and the State Departments detracts from progress. Our rivals realistically recognize the prime importance of such air transport in their drive for national prestige, for export markets, for political alliances.

**3. NATIONAL AIR DEFENSE** is suffering from a lack of appreciation of the fact that the surplus offers the most economical and the most effective means for our national protection. Army and Navy air programs must be coordinated and coordinated. Experts must make a realistic estimate of the minimum air defense requirements in planes and personnel in the light of present needs, and we must build up to that minimum in the shortest possible time. The procurement policies of the two services must be geared more closely to the problems of the mass industry. The production capacity of our plants must be maintained against emergencies. Also, close cooperation must be maintained between Service and Civil aviation.

**4. NON-SCHEDULED OPERATORS** are essential on the new regulations issued by the Bureau of Air Commerce. They find that they are being discriminated against in favor of air transport. They think that their problems are being overlooked in pending legislation, that proposals to require radio in all aircraft and to rule the private flyer off principal airports will work capital handbags upon them. Some form of direct governmental assistance for flying clubs and for schools on the European plan may be desirable. Necessary for the immediate future is a sympathetic and constructive approach to the problems of this group. Its importance must not be overlooked.

**5. AIRCRAFT MANUFACTURERS** as a group have had a hard row to hoe. Lack of coordination of military procurement policies has always made for lean or haphazard production with subsequent violent fluctuations in demand for labor and materials. Over-severe restrictions have made the earning of even modest profits difficult in case out of any government program. The manufacturing industry needs ability, and an opportunity to plan for orderly and efficient development of facilities for both ordinary and emergency conditions. The U. S. is the only air power which gives its airlines no financial assistance in steady progress of developing new equipment. The U. S. gives little constructive help to its small plane manufacturers with equipment in government laboratories.

THREE YEARS ago there was a strong feeling in most branches of the aviation industry that many of the difficulties in which it was then involved could be solved by the creation of some form of permanent authority or commission of a non-political character with broad powers to regulate all civil aeronautics particularly all domestic and foreign air transport. Not that the creation of a Commission would be an answer in itself, but it seemed the first and most necessary step toward the establishment of a long-range constructive program for the development of our aviation.

If the time for such action seemed ripe in 1933, certainly there can be little question of its absolute necessity now. The developments of the intervening three years have multiplied, not diminished aviation's problems. Clearly, as a study of the preceding pages must show, it is a business that is growing so rapidly that its complications are so intricate, and its ramifications so far reaching, that the only hope for continued progress is in the establishment of some centralized authority to coordinate its activities and to shape its destiny.

Other countries have established oceanic relationships to control aviation, or have taken over their aircraft industries lock, stock and barrel, to secure restricted action toward a common goal. But that is not the American way. We want no dictators nor do we want nationalization. We believe in the democratic principle of individual enterprise engaged in freely competitive markets. Yet, for an industry that is so complicated and is so closely related to the public interest as aviation, we find that the necessary directional stability can best be secured by turning over the controls to a duly appointed Authority made up of personnel highly competent in aviation affairs.

Pending before the Congress at the moment are two bills differing somewhat in detail but agreeing in principle on the establishment of a centralized aviation authority. Both the Lee bill and the McCanna bill cover not only air transport, but provide for the regulation and coordination of all civil aviation activities, including those functions now handled by the Department of Commerce.

The difference between the two bills lies, from the point of view of the aviation industry, minor. They concern chiefly matters of jurisdiction and administration. Reasons are current that passage this session may be jeopardized by harking between the executive and the legislative departments, and that certain opponents of one or the other bill might draw society members into the controversy on general principles.

But, if the facts presented herein concerning this aviation industry have been properly read and properly understood, it should be very clear that now, if ever, is the time to forget about minor jurisdictional differences between this group or that, and to drop any ideas of using aviation as a game peg to see how far this faction or that can get in fighting out the government reconstruction issue. Aviation NEEDS a constructive legislative and a NOW. On the part of the aviation industry we urge the Congress to exert all possible effort immediately toward passing the two bills through the respective houses, getting them into conference for reconciliation, and onto the President's desk for signature. The more quickly this can be accomplished the sooner aviation will be free to take off toward higher and better things unshackled by further restrictions and by further petty political bawling.

## Here is a PRACTICAL Solution





H. D. Boydell, Maintenance Supervisor, left, holds receiver AVIATION'S Maintenance Award from the editor of AVIATION at the recent Dulles maintenance meeting.

Maintenance is toward the center of passenger and crew, the protection of a heavy investment is also in the hands of the mechanical departments. American Airlines' flying fleet represents an original investment of upwards of five and a half million dollars, and the constant necessity of spare parts and supplies needed to carry on operations runs close to \$750,000 (including an average of about \$30,000 worth of machine on hand, and some \$5000 for oils and grease). Clearly, then, neither time nor waste may be tolerated in operating or maintenance and the impor-

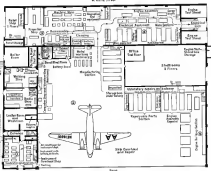
tant of attention to even the most minute detail becomes apparent.

In order to keep track of its details in daily operation, American has developed an elaborate system of record keeping based on plane flight logs and on the inspection reports originating at terminal or intermediate ground stations. Even the slightest irregularity of functioning of any part in the equipment must be recorded on appropriate forms (together with the corrective measures that have been applied) and immediately forwarded to Chicago.

(Turn to page 36)



The instrument shop is busy doing all components, in stock up for the working of everything from engine to control plane.



No space is wasted in the layout of the all-steel Chicago overhaul house. Like everything else in the industrial complex, time is being saved.

Key members in plan refer to photographs on these pages.

Airplane overhaul occupies the central hangar space.



Engineers are carefully checked at every engine change.



After washdown and cleaning, every part of every engine is subjected to microscopic examination. After overhaul the Wright Cyclones and all accessories are assembled on stands to be ready for take-off.



## It's the Little Things that Count



American Airlines' system of "prophylactic maintenance" is based on constant attention to a host of minute details. Every man in the organization keeps his finger on the operating pulse to detect the slightest irregularity and to apply corrective measures before trouble can start.

IF YOU TAKE the ten General and see recovered parts that make up a modern air liner will multiply them by 45—the size of America's active flying fleet—then fly that fleet some 50,000 miles a day over a network of airways stretching from Boston to Los Angeles, you will begin to get some conception of the problem that faces any airline that operates on a transcontinental basis. The astonishingly high standards of safety, regularity and all-around performance that have been set in the past few years stand as a tribute to the men who are charged with the responsibility of keeping the complex combination of the modern airplane to safe operating condition.

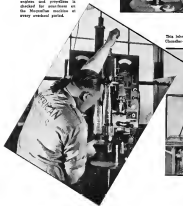
Although the primary obligation of

A very complete equipment log is maintained in Chicago with an individual card for every single piece of equipment (by serial number), right down to items as small as individual instruments, individual vacuum pump, individual hot pump, etc. From this record can be seen at a glance the entire history of each piece of equipment showing from whom and when purchased, total hours here to date when and what troubles have occurred with it, on which shop it is fitted at the moment and its final disposition.

Very close cooperation is maintained among the Operations Department, the Maintenance Department and the Shipping Department. Every day the equipment log reports are submitted, as does a report relative to the correspondence with the various firms with regard to the equipment. Reports sent, the inventory department, the engineering department and to the maintenance department in the shop where the enginehouse is located. For Work, Chicago, Cleveland and New York. Attached to this analysis is a report showing what corrections have been taken on the trouble listed. That everyone from the mechanics on up to the top management are kept informed constantly of the cause and cure of mechanical trouble.

Further, every year all the bi-weekly

Every steel part from engines and propellers is checked for smoothness on the Magnaflex machine at every weekend go-round.



insurance are analyzed and a computerized report showing sociological differences, which have been eliminated during the year is made up. Although all this entails a considerable amount of clerical work, both in the field and in the main office, American Aetna considers it well worth the effort in their program of greater safety by preventive methods of maintenance.

Dr. Ralph Deaton, American Air



Fit them checks out a long  
log boiler as a safety steam  
boiler without installation is a  
DO-E. Pressure regulator  
valve pressure relief valve.  
Relieve air valve, and the  
pressure relief valve may be  
checked.

By means of this auxiliary cylinder the operation of controlled propellers may be directed on the assembly itself. W. J. Eason shows how to make:



This laboratory series attests the proper installation of all Chevrolet-Corvette components before installation.



Fit: What checks or engine cylinders for roundness by applying 200-G per sq in. pressure to a "bank" slip.



For grilling out valve guides, the Future card has by E. Kesting has saved many dollars.



Lower editions of A.R.'s shop equipment is the Wadell valve



every weekday flight is based on the report, and where mistakes are caught without irregularities, the fact is noted by a symbol. These reports are accumulated by the flight controller on the five flight control panels and are relayed to the Chicago office in the early hours of the morning in time to be typed and put on Dawson's desk for consideration as the first item of the day's business. It is only through the awkward attention to every single detail, no matter how small, that a modern airline may be run with safety and economy, and it is a lot of credit to Hugh Green, American's chief flight manager, for his hardy and doggedly perseverant as well as the maintenance department and the irregularity committee. It generally is small as it is.

They consider dissemination of essential information to be one of the efficient machine for the maintenance of airplanes and engines that American Airlines has built up at its Chicago headquarters. Another important department is the engineering department where chief function is not only to develop and specify new parts and ground equipment for the whole system, but also to coordinate and to standardize maintenance and

(Turn to page 30)



All hydraulic wells may be set up to this test panel to check operation of loading pump, wiring, steps, etc. Steve Ross Tiddell is "giving the water" to a set of valves and pumps from a DCA.



# Boeing's STRATOLINER

Preview of a high-level transport of which first production models are to go to PAA and TWA.

**B**OEING AIRPLANE COMPANY has completed the main "Stratoliner" as a trade mark for its 4-engine 307-type transport, the world's first large cabin aircraft equipped with atmosphere-type cabin for high-level operation. The ship will have a fuselage with circular cross section throughout its entire length, without the usual protrusions of cockpit windows. In operation up to 20,000 feet above sea level, these planes will carry thirty-four passengers by day or twenty-five by night at night. They will be operated by a crew of four or five, will have capacity for two tons of mail and air express. Powered by four 1150-horsepower Wright Cyclone engines, they are designed to reach a top speed of more than four miles per minute at 8,000 feet.

Some of the 307 transporters are in production at the Boeing factory; the first ones rapidly nearing completion. The first two will be delivered to Pan American Airways equipped with complete "altitude conditioning" apparatus for upper level flight. Other planes of the series, including six for Transcontinental & Western Air and one additional for Pan American, will be identically designed and constructed so that cabin supercharging equipment may be installed following tests.



Actually, the designed flight path will be in the troposphere, below the true stratosphere, where it is possible to get most of the benefits of high altitudes without getting into the complex problems of flight in the extremely rare atmosphere and low temperatures (105 degrees below zero Fahrenheit) at the true stratosphere. On 2500 horsepower, performance estimates indicate, the ship will cruise at 200 m.p.h. at designed cruising levels. Mechanical superchargers and pressure regulating apparatus will pressure automatically the proper pressure inside the cabin regardless of outside pressure (within reasonable

limits). Ascending or descending the pressure-regulating apparatus will automatically reduce the apparatus change of altitude inside the cabin so that a rate of 300 feet per minute may be maintained all the way from 15,000 feet to sea level, but cabin pressure will change slowly at the rate of 300 feet per minute.

The Stratoliner, an all-metal low-wing monoplane, has a fuselage of semi-monocoque construction, wings of the Boeing combination truss and stressed-skin type, electrically operated wing flaps, cantilever tail surfaces with a single control fin, fully retracting landing and tail gear (electrically

operated), and hydraulic brakes.

The cabin, including its cylindrical walls, windows, doors, and fittings where controls pass through the outer shell, is constructed to withstand a pressure differential of six pounds per

square inch between inside and outside air. The plane will be operated with a pressure differential of only two and one-half pounds per square inch, however, sufficient to keep the upper cabin altitude at 8,000 feet

when the plane is actually 14,700 feet high, and at 12,000 feet when the plane is 20,000 feet high.

There are two fully independent supercharging and heating installations, either of which is capable of handling the entire job alone. Drawn through the leading edges of each wing, both air will be compressed in engine-driven superchargers and circulated throughout the cabin after being heated by means of pressure-cooled condenser type steam radiators. The air will be conducted directly into the cabin circulating system, so that indirectly controlled circulation at passenger seats will supply the same "conditioned air" as the general circulation vents. The space air will be ducted through air exhaust ducts below deck.



Top: Control room of the Stratoliner. Note seat dash for dual crew member. This is for TWA transport.

Below: One of the four crew positions of the air conditioned cabin.

Left: A corner of the hotel sleeping room.

Right: Interior arrangement showing how compartments are arranged for sleeping. Note single doors along each side.



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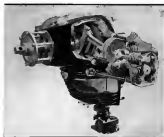


## AERONCA 45 Engines

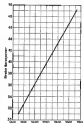
New series develops  
40, 43, and 45 hp.

It is often to meet increasing demands for more power in the lightplane field with a minimum of added expense the Aeronca Corporation of America has developed the new series Aeronca E-113-C engines of 40, 43, and 45 hp. in 2540 c.c.m. into a series of models offering 40, 43, and 45 hp. respectively. The new series of engines, known as the E-113-C, E-113-CD, E-113-CE and E-113-CED are nearly identical in general design. The E-113-C is a two cylinder opposed, four stroke cycle air cooled engine of 113 cubic inches displacement, having a bore of 4 1/2 in. and stroke of 4 in. Overhead valves of automatic steel with hardened valve stems operate on aluminum bronze guides against seats of the same material shrink into T alloy aluminum cast tapered cylinder heads. The heads are bolted with casters steel to a forged chrome-molybdenum steel cylinder. The two-blade crankshaft is of heat treated 2 H13 steel with bevel end cranks, and is mounted on two 3-160 Morse Hoffman roller bearings. One Foster radial thrust bearing of deep groove type at the propeller end of the shaft carries both thrust and radial loads. The crankcase is of aluminum alloy cast in one piece and fitted for cooling. Cooling fins are of 1 section forced steel with steel louvered cutwaters after plate bearings at the crankcase end and a phosphor-bronze bearing for the piston pin. Piston pump ring oil seal hardened SAE 4340 steel held in the "Prestite" grooves by steel snap rings. Pistons carry two compression rings and use oil control ring of ventilated type.

Lubrication is provided by a gear type pump from a three quart capacity oil reservoir in the engine crankcase. Oil is supplied under pressure to the



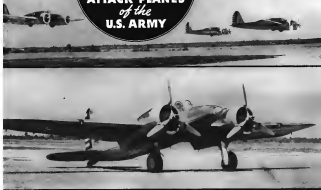
connecting rod bearings; the balance of the engine being splash lubed. Ignition is supplied by a Robert Bosch PT-2-A series magneto driven through an impulse coupling, which cranks at 10000 rpm for easy starting. Compression is furnished by a 1 1/2 in. NAS-2 Stromberg carburetor. An exhaust pulsed pulsometer is installed on all models and recommended fuel is 71 octane, all three models having the same compression ratio of 24 to 1. Fuel consumption is 35 lb. per h. hp. ft.



Power curve for Aeronca E-113-C

The E-113-CD engine delivers 42 hp. at 2500 rpm, and is identical with the 113-C except for dual ignition. The E-113-CE model at 42 hp. at 2500 rpm, carries a slight change in rpm valve and a heavier train of timing gears. The E-113-CED has an approved rating of 45 hp. at 2500 rpm and weighs only 125 lb. complete. The engine incorporates the new cast system, dual ignition, and an automatic overhead oiling system, a feature which is available at special equipment on all Aeronca engines of this current series, and also the older 113-A and B units now in service. Through having the main engine oil through the valve push rod end oil return tubes, the dead points are kept well, thereby compensating for increased water immersion caused by increased cylinder temperatures.

Specifications of the Aeronca 45:  
Weights complete: 125 lb. including two magneto carburetor, but not including propeller.  
Rated hp.: 45 at 2500 rpm.  
Bore: 4 1/2 in.  
Stroke: 4 in.  
Displacement: 113.5 cu. in.  
Compression ratio: 24 to 1  
Speed of rotation, clockwise, 2400 rpm and 4800 rpm—see full crankshaft speed.  
Spark plugs: BG-441  
Oil capacity: three quarts  
Oil pressure: 30 to 50 lb. at 1200 rpm  
Oil consumption: 4 cu. in. per hr. cruising  
Fuel: 72 octane aviation gasoline  
Fuel consumption: 35 gals. per hr. cruising—31 gals. per hr. full throttle.



The Curtiss A-18 all-metal, twin-engine monoplane, with retractable landing gear, is the fastest attack airplane of the United States Army Air Corps.

Equipped with Curtiss Constant Speed "Feathering" propellers and powered by 1000 H.P. Wright Cyclone engines, the A-18 is designed primarily for use in low altitude attack or light bombardment.

A production unit of Curtiss A-18 Attack airplanes was recently delivered to the U. S. Army Air Corps.

CURTISS AIRPLANE DIVISION  
CURTISS-WRIGHT CORPORATION  
Buffalo New York

"The Finest of Aviation"



AVIATION  
April 1939  
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PRECISION-BUILT ARMY AND NAVY AIRCRAFT

# WENDT Monoplane

Placed second at the recent Chicago Show, the Wendt two-place monoplane is a newcomer to the aviation scene. Of unusual design throughout, the Wendt is a broad high wing cabin monoplane providing safe flying conditions. A fixed landing gear is provided with wheel pants and shock absorbers. Powered with the Warner twins Jr. the Wendt is rated by the manufacturer at 142 mph top speed at 2050 rpm and 126 mph cruising speed at 1800 rpm. With a span of 29 ft 10 in. and wing area of 150 sq ft, the Wendt has a gross weight of 1,600 lb, empty weight of 740 lb wing loading of 30 lb. per sq ft, and power loading of 15 hp. per sq ft.

Controls are of the dual wheel type supported from an overhead column control system. Dual adjustable rubber pedals are built. Wings and landing gear are covered with Fiberglass fabric finished with Stinson-Wilkins enamel. Upholstery is by Luffkin, and the cabin is sound deadened and venti-

New cabin monoplane makes debut at Chicago Show



lated. Stinson-Warner heater is optional equipment. Doors are hinged at the top and swing up from the bottom, providing left access in flight for instruction or night seeing. Specifications as supplied by the manufacturer are:

Span 29 ft 10 in.  
Wing chord 100 in.  
Length overall 19 ft 10 in.  
Cabin 10 ft  
Wing area 150 sq ft  
Speed 142 mph  
Max. climb 740 ft  
Gross weight 1,600 lb



Wing loading 30 lb. per sq ft  
Power loading 15 lb. per sq ft  
Power plant Warner Scarab, Jr.—43 hp at 2050 rpm  
Fuel capacity 25 gal.  
Fuel consumption cruising 4 gal. per hr  
Propeller diameter 7 ft  
Top speed 142 mph at 2050 rpm  
Cruising speed 126 mph at 1800 rpm  
Landing speed 42 mph  
Rate of climb 740 ft per min  
Service ceiling 10,000 ft  
Cruising range 300 miles in four hours



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April, 1935  
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## SIR HUBERT WILKINS PUTS "GUBA" THROUGH HER PACES



SIR HUBERT WILKINS  
Meets Old Polar at Alavik

Major H. R. Finch, President  
Geophysical Research Corporation  
San Diego, California

Dear Major Finch—

I am writing you these few lines in anticipation of the meeting which will take place on the 10th of August at Alavik, when you will be met by me and my party. We are all very anxious to see you and to hear of your experiences in the Arctic.

During our search, we covered over 25,000 miles of Arctic coastline, and we were able to make a number of discoveries. We found a number of new islands, and we were able to make a number of discoveries. We found a number of new islands, and we were able to make a number of discoveries.

Although the conditions were very difficult, we were able to make a number of discoveries. We found a number of new islands, and we were able to make a number of discoveries.

In addition, we were able to make a number of discoveries. We found a number of new islands, and we were able to make a number of discoveries.

It is my privilege to congratulate you and your party, and to wish you all the best in your future endeavors. I am, Sir, very truly yours,

Sincerely yours,  
Hubert Wilkins



MAP OF GUBA'S COURSE

BYRON (P-1) CHESMAN (C-104)

CONSOLIDATED  
AIRCRAFT CORPORATION  
San Diego \* \* \* Established 1923



REINDEER HERD AT BARTER ISLAND

NO WORDS NEEDED

GASSING AT ALAVIK  
IN THE ARCTIC CIRCLE





# MILWAUKEE "Sky Motor"

70 hp. light plane engine is mounted in-line type

Designed by the Milwaukee Motor Corporation, the Sky Motor is arranged in the familiar in-line inverted fashion, the top of the engine is only two inches above the condenser underside. An integral oil pump keeps the bottom of the engine in level for cooling and has a capacity of two gallons. Already shown the pump is the water-cooled exhaust housing with a five bearing crankshaft. Can Milwaukee beat directly as well as the

prop, standard double ventral control, standard automatic drive, popular two and six valve swing valve and reduction belt were completed early in February and are in production. Motor mounted in a 10 hp at 2000 r.p.m., though 66 hp is



## TRIMMER Seaplane

Monoplane flying boat powered by Solinas engine



**TRIMMER MONOPLANE.** Designed by Walter Z. McGary of the Seaplane School of Aeronautics, Inc., the Trimmer flying boat is a power engine installation and a single engine flying boat in the 70 hp. Seaplane Model B. The airplane was built by the Seaplane School of Aeronautics, Inc., and is used in its own market in the seaplane power class. The prototype of design will be applied in larger models of the single and twin engine type.

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available in 2500 r.p.m. according to test.

General specifications are:  
Dry Weight: about 70 lb. dry drive  
Type: air cooled, inverted, inline  
Number of cylinders: four  
Bore: 4 1/2 in.  
Stroke: 4 1/2 in.  
Compression ratio: 200 r.p.m.  
Crankshaft: 52 in. x 1  
Diameter: 80 hp at 2000 r.p.m. max. test  
Rating: (Maximum) 70 hp at 1200 r.p.m. at sea level  
Fuel: 70 octane  
Fuel consumption: 56 lb. per hp. hr. at 7500 r.p.m. (max.)  
Oil consumption: 10 lb. per hp. hr. at 7500 r.p.m. (max.)  
Weight: (in air) 100 lb. at 7500 r.p.m. (max.)  
Length overall: 48 in.  
Dry weight: 100 lb.  
Dry weight: 100 lb.

Aircraft Manufacturers:

# COMPARE MENASCO 250

with any other engine

## MENASCO Model CBS-4

DISPLACEMENT	544 cu. in.
COMPRESSION RATIO	5.6 to 1
DRY WEIGHT, complete	528 lbs.
HORSE POWER for take-off	865
R P M for take-off	2400
HORSE POWER, continuous	2600
R P M, continuous	2300
HORSE POWER, cruising	2000
R P M, cruising	2050
HORSE POWER at 7500 ft.	2,050 lbs.
WEIGHT PER H.P.	1.04 lb. per H.P.
HORSE POWER PER CU. IN. DISPLACEMENT	.877
SUPERCHARGER	In-built, centrifugal
FUEL CONSUMPTION	104 lb. per H.P. Hour @ 260 H.P. Output
FRONTAL AREA	2.9 sq. ft.
VALVE MECHANISM	Automatically lubricated and fully enclosed
OIL FILTER	PRESSURE-TYPE COOLING RADIATOR
Provision for All Accessories	Available for all Propellers

## ANY OTHER ENGINE

DISPLACEMENT	cu. in.
COMPRESSION RATIO	to 1
DRY WEIGHT, complete	lbs.
HORSE POWER for take-off	
R P M for take-off	
HORSE POWER, continuous	
R P M, continuous	
HORSE POWER, cruising	
R P M, cruising	
HORSE POWER at 7500 ft.	
WEIGHT PER H.P.	lbs.
HORSE POWER PER CU. IN. DISPLACEMENT	
SUPERCHARGER	
FUEL CONSUMPTION	lb. per H.P. Hour @ _____ output
FRONTAL AREA	sq. ft.
VALVE MECHANISM	Automatically lubricated
OIL FILTER	Fully enclosed
PRESSURE-TYPE COOLING RADIATOR	
Provision for All Accessories	
Available for all Propellers	



**MENASCO MANUFACTURING CO.**  
8151 MCNEELY AVENUE, LOS ANGELES, CALIFORNIA

MENASCO ENGINE ARE BUILT IN 7 MODELS  
— 80 hp. — 85 hp. — 100 hp. — 120 hp. — 150 hp. — 180 hp. — 200 hp.

# AIRWHEELS®

**DELTA AIR CORPORATION**  
 INCORPORATED IN AL  
 EXHAUSTIVE MODEL LIMITED

Conventional tubes and wheels are standard equipment on all our Lockheed Electra Transports, which is the most popular aircraft in the world today.

*[Signature]*  
 C. E. Wentlow  
 General Manager

Goodvent Blue Berries are safer

On many other famous American and foreign air lines and military ships Goodyear landing equipment is standard because of its proved superior safety and dependability. Goodyear engineers will be glad to consult with you in specifying the correct size and type of tires and brakes for any ship — just write Goodyear, Aeronautics Department, Akron, Ohio, or Los Angeles, California.

**"IF IT ISN'T A GOODLINE  
IT ISN'T AN AIRWHEEL."**  
AIRWHEEL is Goodyear's  
male mark, registered in  
the U.S. & used throughout  
the world, and is used to  
denote that Goodyear is the  
exclusive maker of AIR-  
WHEEL Tires.

THE GREATEST NAME  IN BUSINESS

**GOOD YEAR**

ON YOUR NEW SHIP SPECIFY GOODYEAR AIRPLANE TIRES AND BRAKES

April 1977

## REVIEW, COMMENT, REFLECTION

DANIEL SAYRE  
C. F. McReynolds, Pacific Coast  
Helen Stubbins, Washington  
J. B. Lusk, New York

APRIL 1938

Story on page 52



**SQUALL LINE:** One of these machines was seen above what a modern military machine could do with a 1936 Fiat wild what it was flown one night recently from Edinburgh to a field near London at an average speed of 400 mph. It was all very reassuring. But realistic M.P.s want to be met last week with Britain's Air Minister, Viscount Jordan, charging ineffectually in the Empire's air command, claiming that not a single important maritime sector of Germany could be reached by present British bombers. The King's



葛平王馬路分館  
藏書日期：2008  
冊次

## North American To Sell Eastern Air

#### Nickashekar hooks up gate control after TWA bid falls short

Who is good to any Eastern Air Lines? Ever since the Air Mail Act 1934 specifically left a loophole through which a transcontinental system could acquire Eastern assets, rumors have been floating like Cuba in an air port. Last month the pay-off. We reprint the following excellent summary from our subscribers, Business Week.

"Capt. J. M. [REDACTED] Eisenhower, America's No. 1 wartime pilot, is well in control of the starplane. Korean Air Lines, despite effects of Transportation and Western Air (London) Ltd. is looking to take it over," he said.

Washington, D.C. [REDACTED] the banking firms of Smith, Barney & Co., and Cohen, Lock & Co., notified John F. Kennedy, of Lebanon, Mass., to acquire Grumman Air Force, North American Aviation Co., and Lockheed Aircraft Co., of North American and as operating lines of Eastern Air, had the "mole" leak. But in the end, it was money that saved the successful but silent star pilot, 32,000,000 in cash. The TWA one million, 100,000 in cash and 100,000 in stock, 100,000 in cash.

Rockefeller will head Eastern Air, after it is divorced from North American. It will be independent. In addition to seaboard routes, it runs planes from Chicago to Miami and from Atlanta to New Orleans and Houston. He now partners with Pan American Airways, while Eastern serves as a feeder, having proved a disadvantage. Indeed, Eastern is one of the few air transport lines to operate at a profit. Export for 1961

Just east, reveals net income of \$107,000 on an overhead budget of \$2,000,000.

"After a series of legal wrangles, the South, Barney-Kuhn, Loch banking group will place stock of a newly formed Eastern Air Lines corporation on the market by semi-private or public offering.

That first, North American Aviation shareholders must approve the sale. A meeting has been called for the end of this month to put the proposition to a vote. Inasmuch as General Motors Corp. owns approximately 50% of North American stock, and inasmuch as G. M. officials were

consulted, it is expected that the necessary votes will be attained.

\*South American will then act up Eastern Air Lines as a separate corporation, will receive the stock of the new corporation with the Securities & Exchange Commission, and then Smith, Barney and Kahn, Loeb will go through the formal process of buying the stock. The American markets being willing the stock will be distributed along about April.

\*Sale of the Eastern Air properties by North American accomplishes two purposes: (1) provides North American, which specializes in the manufacture of war planes, with additional capital for expansion—in preparation for a heavy rearmament demand from the United States Government; (2) frees Eastern Air from a doubtful status under the new covering air mail contracts.

## Planes Are Heroes of L. A. Flood

TWA ship loss is only casualty in wildly busy week

One of the greatest earthquakes in the history of Los Angeles, and the most destructive of life and property.

cock out of the suitcase when a TWA plane disappeared over central California Tuesday night, March 1, while en route to Los Angeles from San Francisco. As we go in press three weeks later, no trace has been found despite an intensive search headed by Jack Frye and Paul Babson, TWA president and vice-president, respectively. The plane man in charge of Capt. John D. Graves and three were

none persons aboard at the time. It is believed to have crashed in the Sierra Nevada mountains west of Fresno, deeply nestled in snow. Covered stores have hampered ground and air search parties.

Through the storm blanketed all of California for several days, and completely stopped airline operations at Wednesday, March 2, it brought rich compensation to the lines thereafter. Heavy loads of Wednesday and Thursday, March 3 and 4, completely emptied Los Angeles from the outside.

[illegible]

world, walking out numerous bedrooms, stopping at each and then walking out of Southern California, and even descending out all of the library's book service.

group messages carried in and out  
(Turn in Page 21)

### Beard's Makes a Million

**Camco** also had a profit of \$104,648. **Alvord & Company, Inc.**, for the fiscal year ended November 30, 1937, totaled \$1,881,533.64, equal to \$100 a share. The 177,000 shares outstanding, according to a report by Donald Douglas, President. This suggests that a profit of \$100,342.31 for the 1938 fiscal year. Mr. Sales last year totaled \$1,214,335 compared with \$1,037,700 in 1936. The 1937-38 year ending of \$1,037,700 on Feb. 27th, 1938, stood at \$1,300,000, compared with \$1,047,000. The previous year. Approximately one million dollars was expended for new equipment and plant construction during 1937. Current assets as of November 30, 1937, totaled \$1,734,818.23. The 1937-38 current liabilities were \$1,047,000.

## Operators Would Organize

**A STUDY POOR OF LETTERS** from local line operators endorsing the idea of forming a national association is coming in to the organizing committee, according to Hugh C. Follides of Cleveland, who is handling the preliminary survey east of the Mississippi. The western division is being surveyed by Neil Fleming of Dallas.

The organizing committee was formed at a meeting during the Chicago Show with Ed E. Branch of the U. S. Junior Chamber of Commerce acting as chairman. Minutes of the several sessions will be prepared and distributed by AVIATION magazine.



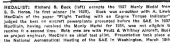
**GENERAL PROPOSED:** This "tiding hotel" lavatory room with toilet has been projected by Major Alex de Fovarsky's company to meet Pan American's specifications for a trans-Atlantic transport (see AVIATION, January, 1966). Intriguing features are the disposition of the eight 2000

ing liquid-cooled engines, and the proposed use of stainless steel for the major part of the structure. Most steel suppliers confess that the twin beds which are intended to retract upward against the bottom of the fuselage among the machines has cleared the water.



**FOR THE FAIR.** The symbolism of the exterior design of this building, which will house the annual convention of the New York State Bar, 11/26, doesn't quite get there yet. In fact, that symbolism, of the bar, is a subtle and somewhat awkward arrangement. It indicates many possibilities for seriously affecting design of elements and accessories. With the opening of the fair but one year away, plans for construction of the building are well along and architectural people are already designing displays. For Maxson, chairman of the board of the Spaulding Corporation, heads up the architectural advisory committee.





## AVIATION PEOPLE

### What's New in This Month's News





OLD TIKER. General Victor Wall, Ottawa, remarks that the flying school service is one of the most important services in that country. After 12 years in the military he transferred to the air arm in 1919, qualifying for his pilot's license. Although serving throughout the War in various capacities, his specialty has been in aerial navigation and he has been in contact with leading driving crews across swamp swamps. Since the Armistice his employment work in the Ontario has made him one of Canada's leading desert flyers.

**WIS North Atlantic** explained in beginning to take shape abroad. In England, the eight additional Empire boats recently ordered will be built to 15,000 gross tons gross weight, 4,000 over last year's tonnage. About 1,000 of this will go to Pakistan, the rest to structures. Power will not be excessive—they can't get off with this load—though probably be confined to the coast, though that always has been part of the plan. The Navy is also at least one time the "big brother" because its planes should be replaced. Since there's only one destroyer, the if the commander is captain, the "destroyer" will probably have to be trained by ship stops. Air France Transatlantic will also divide in 1972, offering two GAMES 10's and three Labrador 427's as engines.

...of which have been completed. M. Bore, equipment director of Air France and chairman of the Lary SE 200, resigned from the technical committee as a result of its closure.

Meanwhile the French have been to the American Airports to charter a Boeing 747 to get the line going. The plane in Europe is that Air France has not offered them the use of the six 747s it has, but it has offered to charter a French 747 when they were before.

They have received the first of the two L&M 747s from the South Atlantic passenger service—these are expected by July to open the line, carrying eight passengers an hour.

A 120 degree pitch change propeller made by Lerer has been tested on the first engine French flying boat CAMS 341. For maneuvering on the water the outboard propellers are set for thrust astern and the inboard for thrust ahead—by working the throttle the boat can be astern in either direction or spun around short. Engines are warmed up at zero pitch—all incoming water and water waste handling.

French air reinforcements seem to spin around in one place, too. France has again the government may it's production total from entanglements of the infantry and the new labor laws—there for the govt's own life plain lack of money. But for the more his mainly lost, to find anyone concerned one who lives in the Chamber of Deputies, to find out what the French government has to do, French military situation is about on a month with about 40,000 employed—compare this with about 85,000 troops and military planes plus 270 light planes per month, 38,000 men, in the U. S. in 1935. What worse the French is their belief that

plants are working overtime landing out military aircraft. A recent survey claims that present production capacity without any change in the system is 142 planes a month, and says all that's needed to give Chief of Staff Genshyn the 2,000 he wants by the end of 2002 is some money to build three new plants.

pled for the opposition with a few promises of reform in the governmental operational structures, has won out. The budget has been changed to call for an extra appropriation for the fire force amounting to \$52,000,000 earmarked for new equipment. Most likely this dispels the notion that France was about to place large military orders in the U.S. With a total of 1,600 planes this year — an increase from 1,400 in 1985 — and 10,000 more in 1987-2000, at night—up about 18 per cent from 1984.

No details are available for comparison with the 75 by 2 foot long tunnel of the NACA.

layer can be lifted easily in England it has done so even *AW* Ministry regulations. The air from 3,500 to 10,000 feet is divided into zones, each usually visited into tender layers, one for every 20 degrees of compass distance. When turbidity is under 1,500 parts per volume has to be put in its proper layer.

Also from England comes news of a "simple bottle" for lifted spunging—a device using a cylinder with tabs to indicate position on a map in the cockpit. It operates by automatically taking bearings on two radio stations.

Bliss powered fighters are under test abroad. Germany shows over 200 mph for a new Heinkel that has two engines in the wings and two turbo-superchargers around behind a Fiat D.F. Junkers diesel. . . . The French, not to be outdone, have a Clerget diesel in a Hispano fighter.

My mail of 1916 mail postal rates is the new regulation on Atlantic News. France, already got into effect on the Paris-Marseilles route. Six months before on England-South Africa, made that the results of the All-Paris-Chinese Empire-Mail-By-Air scheme—six and back up to ten times what they were. All first class mail at 10 per cent.

Here details on the illegal creek on the American coast are given in First Nations (Algonquian) (and in a few cases Spanish) language. The creek is a proprietary to a forced Indian slave. Labels in German, in that first book are at least in part correct. The creek is a place where Indian slaves were kept and sold on the water. Also on the bank of the creek are Captains Viola, and other men. The creek is a place where Indian slaves were kept and sold on the water. Also on the bank of the creek are Captains Viola, and other men. The creek is a place where Indian slaves were kept and sold on the water. Also on the bank of the creek are Captains Viola, and other men.

## Planes Fight Flood

(Continued from page 111)

by all the skimmers. Due to weakness of many trunk knee joints of the tubergroup components were able to handle more business, which was abnormally high due to food conditions. Consequently hundreds of pounds of tubergroup messages were flown out to San Francisco, Salt Lake, or San Diego.

try to be transmitted over the super high system, and stations were widely hindered in the same way. All of the news and sports news, including the 11:30 a.m. news, was cut off. The radio stations, newspaper news, and photographers, to seek out religious services in isolated sections and in the mountains, were not able to do so. The work was cut sharply from the air when fuel and supplies were received and dropped to isolated groups in mountainous regions. Since January, 1945, the radio stations have been able to show the film of the relief work. American Airlines run air planes which stop daily on Friday and Saturday following the storm, carrying new films and batteries. The radio stations are now working with the other stations. American had to rely completely on their own radio system for transmission of weather data and emergency messages, as the super high system cut out. The Americans who were on board, now commenced telegraph messages also over its radio system, in addition to the weather data.

age a great quality to most people, back and forth between Los Angeles and Hawaii, where they were available. On Friday afternoon, a train of isolated streetcars in the San Francisco area was seen with a number of people on board. The popular desert resort was completely off the ground, the outside world and a large shipment of bread and other goods taken in by air, as well as a short-term relief to the reconstruction purposes. Another unusual service was rendered by Western Air Express in operating last train. A number of trains of various road systems became isolated due to work-out and, in the absence of independent streetcar, train dispatchers had no information on the location of their trains. Western Air Express pilots landed a number of trains from the

## AVIATION BOOKS

*Accurate Services Manual*, by Victor W. Fager, The Norman W. Hensley Publ. Co., New York, 1954, 562 pages, \$4.00.

One of the most comprehensive books on the subject that has been published. The author has gathered together a vast amount of practical information from many sources, and has done well in the matter of selecting up-to-date pictures in electronic his power. A "must" for the staff of anyone who has to do with operating air-traffic airplanes.

**ARMY ENGINEERS, DESIGN AND PRACTICE**, Volume 1, Handbook of Army Engineers, by Andrew Goss, Sir Isaac Pitman and Sons, Ltd., London and New York, 1939; 478 pages, \$7.50

First published in 1921, the present volume is the third revised edition of the original work, at a time of enormous expansion of the knowledge of aerodynamics in the United States. It is the work of the Council of the Royal Aeronautical Society. Subject matter ranges from the extremely theoretical considerations of stresses and vibrational modes in aeroelasticity to practical methods of lifting surfaces and to proper winging-up procedure. Based largely on Reports and Memoranda of the Aeronautical Research Committee, and on other Air Research material, the viewpoint is, of course, thoroughly British. But the book is easily comprehensible to American readers; they have mastered the simple technique of reading "propeller" for "screw" and "ground" for "air."



**FEEDING TIME?** Not only. Picture shows a long nose being loaded into one of the new Fleet Freighters (Fleet Aircraft, Ltd. of Fort St. John, Canada). Designed for cargo haulage in the far north, this machine is equally at home on wheels, floats or skis. Power plant consists of a pair of 300 hp. Bristol engines swinging Curtiss-Wright props. Description in an early issue.





# NORTHWEST *WINGS*



*Northwest Airlines is known as "The Yellowstone Valley Route." Northwest's Sky Zephyr after just, luxurious service between Chicago and the Pacific Northwest.*

\*\*\*

*Texaco Asphalt makes resilient, rugged, economical surfaces for airport runways, hangar floors and aprons, taxiways and parking areas.*



**NORTHWEST**  
AIRLINES

## THROUGH WESTERN SKIES ON

# TEXACO



*This map shows Northwest Airlines' route between Chicago and Seattle. Sub-zero winters, and scorching summers make this super-secure territory tough on engine oil. Northwest uses New Texaco Airplane Oil.*

• Operating between Chicago and Seattle, NORTHWEST AIRLINES flies through one of the most scenic sections in the United States. As an aid in flying this beautiful country, NORTHWEST continues to use New Texaco Airplane Oil.

New Texaco Airplane Oil has amazed the entire aviation industry by its virtual elimination of engine wear. Keeps rings free in their grooves, valves working properly, maintaining compression and saving fuel.

Intervals between required overhauls are extended. More scheduled airline mileage is flown with New Texaco Airplane Oil than with any other brand.

You may order Texaco Aviation Products at all important airports. Passport service assured through 2000 warehouse plants throughout the United States.

The Texas Company, Aviation Division, 135 East 42nd Street, New York City.



# NEW TEXACO

AVIATION  
April, 1935  
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# AIRPLANE OIL

AVIATION  
April, 1935  
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# Buyers' Log Book

What's New in Accessories, Materials, Supplies, and Equipment



Fognozzle in use

## Fognozzle for Aviation

A new method of fire extinguishing

Based on years of use, a new type of fire fighting is brought to the aviation industry by the Fog Nozzle Company, 1520 East Skidway Ave., Los Angeles, California. Particularly suited to fighting fire involving liquid fuels, petroleum products, or airplane crash fires, the Fognozzle equipment is based on the use of water alone, although it may be used to advantage in conjunction with CO<sub>2</sub> in certain types of fires. Developed by Benjamin Chas. Green of Granddall, of the Los Angeles County Fire Department, the Fog Nozzle stores water into a fuel fog, the process being accomplished with solenoid-powered jets which are available from most water mains and fire hydrants. It is pointed out that the Fog Nozzle has portable water tank trucks on airports, etc.

Fognozzles are available in a wide range of types and may be used for portable hand operation, or as permanent outfitting or built-in installations for automatic fire extinguishment. The Fognozzle principle of fire extinguishment is rapid cooling of the gases of combustion, which results in almost instant reduction of heat on the fire area and makes it practicable for the operator to walk directly up to the hottest fire and fight it in close range. In the case of airplane crash fires, the Fognozzle permits the fire fighter to throw a cooling stream around any personnel trapped in the wreckage. Also, in such a case, the stream of water fog protects the trapped personnel from any harmful effects of CO<sub>2</sub> or other fire fighting chemicals as use at the time.

—AVIATION, April, 1935

## Skysurvey Camera

New model designed for private flyers

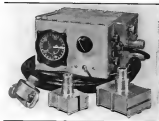
Designed primarily for private pilots, the latest addition to the line of the Skysurvey Camera Company, Cleveland,

Ohio, is styled the World K. Like the larger Model D, it is an all-purpose unit designed for use in the air and on the ground. A little more than six inches long, the Model K weighs two pounds five ounces and uses 2400 35mm. It is equipped with a specially made Weimer 945 lens. Sky-view shutter with speeds of one-half second to one hundredth second, and accurate focusing from five feet to infinity.—AVIATION, April, 1935

## Vibration Meter

Sheffield Gauge offers device covering wide frequency range

TO DETERMINE the vibration resistance of wings, fuselages, engine mounts, propellers, and other units, and the loading of wires and rods, the Sheffield Vibration Frequency Meter has been developed by the Sheffield Gauge Corporation, Dayton, Ohio. It is a standard form; the device has a frequency range of 125-2000 cycles per minute and, with modifications, the range can be extended to 5000 or more cycles per



Sheffield Vibration Frequency Meter and accessories

AVIATION

April, 1935

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minute. Developed by aviation engineers this device has been used by both military and commercial air services.

For use as a transducer, vibrations are generated by an automatic rotor driven by a flexible shaft. The rotor is in a housing having an integral unbalanced damper. For determining resonant frequencies of larger units the vibrations generated circulate at a square wave, incorporated by a crank operating in a slot in Scotch yoke within the weight. It is driven by a flexible shaft and has a housing and damp. A variable speed D.C. motor with a high precision tachometer, controls the instrument.—AVIATION, April, 1935



Sheffield Detector

## Fire Detector

Remington device uses 22 cal. rifle shells

A recent patent of the Remington Detector System announced by Walter Kilde and Company, Bloomfield, New Jersey, for use in aircraft, is the use of 22 caliber rifle shells as the detector unit. The shell is specially manufactured and has no holes or powder charge, but contains the primer charge in the base. The detector unit is so placed that any temperature greater than 250 degrees F. will fire the shell, which fires a signal along a tube to the pilot's cockpit, or it is so located that the fire extinguishing system is automatically brought into play. The fire extinguishing system is the standard Remington tank and distribution system by which the CO<sub>2</sub> gas is piped into the engine compartment, where it usually fits the fire out at its source.—AVIATION, April, 1935

# PROOF OF DEPENDABILITY



## IN AIRCRAFT TUBING Can Only be Measured by PERFORMANCE

Not content with having led the way to the present established Army and Navy standards of Chrome Molybdenum 4130-X Steel tubing for subair fuselage construction, "Ohio" metallurgists and craftsmen pushed on to greater accomplishments.

Today "Ohio" controlled atmosphere annealing and normalizing process gives "Ohio Special Quality" Tubing additional factors of safety in aircraft construction. Where safety is paramount, manufacturers look on Ohio's performance record.



"Ohio Special Quality" Aircraft Tubing is now standard in the world and aviation sections as well as special shapes



Specify "OHIO SPECIAL QUALITY NON-OXIDIZED"



The OHIO SEAMLESS TUBE Co. SHELBY, OHIO.

AVIATION

April, 1935

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# "UNITED" LANDS SMOOTHER — STOPS SMOOTHER WITH



**125 MILLION MILES OF FLIGHT!**  
That's United Air Lines' record for "smoothness" in its fleet. And it's no surprise! And it's due to New York Chicago California and Seattle San Diego routes with both the smoothest and most comfortable flying possible in the world today.



## United 'Mainliners' Now Protected by "Teamwork" Control of Both Goodrich Low Pressure Tires and the New Goodrich E. T.\* Airplane Brakes

Since its inception, United Air Lines has been among the first with new developments in air travel. Year after year, United Air Lines adopted the most safety and soundness of landings on Goodrich Airplane Silvertowns. It was among the first, too, to give passengers the most secure protection of Goodrich DECTED the remarkable safety features of its rubber cushion, overhauled flying possible in

planes of heavy weather, although still safe. And now another Goodrich engineering development — the new Goodrich Expander Tube Brake — is here to give landings that are safer, smoother than ever.

Because Goodrich Airplane Silvertowns are equipped on the low pressure tires with their specially adapted themselves to an endless range of loads, speeds and landing surfaces. And when paired with the new Goodrich E. T.\* Brake the response is more flexible landing control for all types of planes—whether cushion and glass or light open plane.

### Over 40 Aviation Pioneers

Goodrich—the same engineering ability that developed the Goodrich Airplane Silvertowns, the Goodrich DECTED, and the Goodrich E. T.\* Airplane Brake has also given you the feeling of over 40 Goodrich products used by the world's top flight planes, plus airlines and all lines. What's more, it's the successful Director of The E. F. Goodrich Co., Akron, Ohio, the complete solution. Ask for a copy of "Goodrich in Aviation."

\*Expander Tube

## NEW GOODRICH EXPANDER TUBE BRAKES ON ALL MAINLINERS!



As you can tell from the flexible development in the picture, this new Goodrich Expander Tube Brake has been selected for the greater reason: it's more efficient landing for all types of planes. Not only does the new brake give infinite pressure reaction, the brake does it all while the plane is automatically adjusted itself to adjust landing speed. And remember, whether your plane is loaded for one passenger or fifty, there is a Goodrich E. T.\* Brake for your requirements. It runs water, oil, hydraulic or air—expander braking under all conditions, quickly and with E. T.\* Airplane Brake.

Read what J. A. Worley, United Air Lines' Director of Engineering, says:



"Goodrich Expander Tube Airplane Brakes are used on all of United's 14 Douglas DC-3 Silvertowns, including the United's 14 Douglas DC-3 Silvertowns. It's a requirement with these brakes has been very satisfactory and shows their capacity to maintain and maintain in relation to their own operation. About, our planes like the brake cannot be more."

*J. A. Worley*  
Director of Engineering

AVIATION  
Aug. 1939

# WITH GOODRICH TIRES..... NEW GOODRICH E.T.\* BRAKES



**ICE-KEEP OFF!**—No ice is allowed to build up on the airplane, or on the edges of Goodrich Main Brakes. That's because Goodrich DECTED has a compound "ice" on the surface. The special compound and "finger ring" landing surface is the left of the main brake. The main brake is a rubber shoe that fits into the shoe. The shoe is made of steel and the landing edges of the shoe are protected by Goodrich rubber shoe. Goodrich rubber shoe, which shows up as soon as it is in the shoe. Goodrich DECTED gives complete protection.



## Goodrich Airplane Silvertowns THE SAFEST AIRPLANE TIRE EVER BUILT

Over 40 Rubber Products for Airplanes—Including Tires—Tub Wheels, Airplane Brakes, Tire Valves—Building—Rubber—Steel—Concrete—Black Aircraft Fuel—A Complete Line of Rubber Accessories—Aircraft

AVIATION  
Aug. 1939

## USED ON LEADING AMERICAN AND FOREIGN MILITARY AND TRANSPORT PLANES

**A. B. WALLIS** Superintendant of Maintenance, **AMERICAN AIRWAYS, INC.** and winner of **Alexander's Maintenance Award**, states "LIQUIDOMETER electric fuel gauges used on our Douglas glider engine installation".

**LIQUIDOMETER GAUGES** provide positive dependability and accurate knowledge of the quantity of fuel at all at all times.

Hydraulic transmission type **LIQUIDOMETER** used where a separate oil-pressure gauge is desired for each tank.

**LIQUIDOMETER** electric gauges are used where indication for a group of tanks is desired on one indicator unit. One model provides a separate dial for each tank controlled by a switch system—practical and is particularly adaptable where there are a number of tanks of different capacities.



**THE LIQUIDOMETER CORPORATION**  
 3811 MARSH AVENUE AT 37th STREET LONG ISLAND CITY, N. Y.

ATTENTION  
 April, 1936  
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## Little Things Count

(Continued from page 21)

springing practice from coast to coast. William C. Littlewood, assisted by Otto Kirchhoff, both men of long experience as air transport engineers, head up this department.

H. D. Ingalls, superintendent of maintenance, winner of *American's Maintenance Award for 1935*, heads up maintenance service and overhead work for the entire system. From the photographs accompanying this article, which show the layout and main departments of the Chicago base as well as a number of the specialized jigs that have been developed for certain special overhead jobs, one gets an impression of the amount and quality of maintenance work done to keep *American's* airplanes operating safely on their appointed rounds.

Such a system of control of the important little things depends greatly on most accurate communications, and *American's* communication system under J. C. Flynn, Superintendent of Communications, plays an important part in keeping the head office promptly informed of all news and in disseminating instructions.



"THE IRON" *AA's* exclusive Denny Box located this gadget in check operation of electrical systems on airplanes. It gives the standard control line connections, sometimes directly joined to instrument function of battery, generator, and wiring, Denny is simple.

## Operators' Corner



An exchange of ideas on the problems of the commercial aviation industry

**QUESTION:** In what capacity would you like to see the aviation industry? What kind of conditions do you want and in what line do you think the industry will move? What kind of conditions do you think the industry will move? What kind of conditions do you think the industry will move?

### Step in Night Direction

THE NEW REGULATIONS are a step in the right direction. They point both the private pilot and the airlines, too. Moreover they will require more nearly uniform equipment for ships flying on the airlines and will require that the people who fly them have greater knowledge of the problems encountered.

Of course some private pilots with ships not equipped with radio will find the equipment needed is expensive and will object if the government steps in and requires such equipment. But by and large the regulations should protect a very large percentage of the people who fly.

It is better that the regulations be too stringent at first to that air traffic will not get out of hand making regulations more difficult. But it is always possible to remove the rules to make them more lenient. Since the highest percentage of accidents are in the private flying group it is better that the regulations must be convenient to make them most effective.

We are complying with C.A.R. as rapidly as it is possible to do so. All of our planes have been fitted with the required equipment and our pilots are getting instrument ratings as quickly as possible.—A. C. Bess, Chief Pilot, D. J. Wilkins, Inc., *Wings Around Field, Brooklyn, N. Y.*

### See Your Lawyer

THE PROBLEM with the new regulations is that they demand in legal philosophy and technicalities that are very difficult for practical operators and pilots to understand. For example, in one place there is a requirement that solo pilots bring instruments with an instructor must carry parachutes while in practice section they state that

solo pilots are not permitted to carry any property at all. Similar examples of unnecessary are not difficult to find on careful reading of C.A.R.

It is very understandable that the regulations are to be revised extensively and it is hoped that they will finally emerge in a much more readable form.—W. D. Givens, President, *Reverend Field, Inc., Macon, N. Y., N. Y.*

### Special Rules for Light Ships

UNDER THE NEW REGULATIONS it becomes more difficult to get a private pilot's license because instrument and navigation are required as in the case of the transport rating. These subjects are useful but are frequently merely conventionalized later longings by many pilots who never have occasion to use them. It is particularly unfair to those light plane pilots who do not do extensive cross-country flying.

We do not feel that an instructor's

rating should be necessary for light planes. These facts lead to the conclusion that there should be a separate set of regulations for light planes, taking into consideration the fact that there are a certain number of pilots who do not care to fly very far away from the home airport and operate for the most part within a radius of less than 100 miles. It then is reasonable that under C.A.R. no one is permitted to fly in a dual control ship unless one control is manned by an instructor.—ALBERT E. BERRY, President, *Reverend Air Service, Weymouth, N. Y.*

### Next Month's Questions

**QUESTION NO. 20:** Do you feel that dual hour operation need an instructor to permit dual instruction and prevent dual errors in instrument? If so, who should be included in such an instructor? How should it be approved? How should it be approved? Please answer in detail.



Seba Preston Monahan, C. A. Parker of *Imco City Airlines* was responsible for this window display in *Weymouth, Mass.*

ATTENTION  
 April, 1936  
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Continued from page 63

### Re-Click-It Breakers—

and special housing offered by  
Halsam & Co.

**KNOWN AS THE KO-CORK IT** PREHEATS and also available with a special safety heating for protection in hazardous locations, control heating equipment is being marketed by the Heilmann Electric Co., Trenton, N. J. The Ko-Cork It heater is fully magnetic and non-thermal, available in ratings from 50 milliwatts up to 25 watts, and for currents operating up to 200 volts D.C. or 400 A.C.

## Aerowise

### Two new high-power transmitters announced

As contrasted to the American D30 two new units to the Aerovox R92, a remote controlled model, and D40 direct-controlled have recently been offered. Both transmitters, except for the control mechanism, are the same. They employ a 9L6 as a stabilized crystalized controlled oscillator (1140 and 3120 kc.) which feeds an 8K9 amplifier. The 8K9 operates as a linear amplifier for 2165 and 3120 kc. and as a doubler for 6318 and 5240 kc. The modulator employs two 6L6's which modulate the plate and screen of the amplifier tube. A high gain audio noise microphone drives the grids of these tubes, through a complex transformer, to a maximum modulation percentage of 100 per cent.

In the remote-controlled model, the control unit (weighing 1 kg) contains an on-off switch, a four-position selector for selecting any one of the four transmitters (frequency, and a



FloraWeb Transacting by Standard International

8,916,300  
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tuggle with providing continuous dynamometer operation (for on- and off-board use) or stand-by operation and for phone. This is the latter operation, the operation of the dynamometer is controlled by the "push-to-talk" button on the microphone. In the direct controlled mode, the same controls are mounted directly on the panel. An antenna phasemeter relay, for using a single antenna with both transmitter and receiver, is optional equipment.

### Three-Watt Transmitter

Standard Transformer enters field with equipment for the private line.

**As the** system, consisting of the aircraft radio link, the Standard Transceiver Composites of 680 Blackhawk Street, Chicago, announces the Hawk 18-Aero, a 5-watt, 10-pm, two-tone transmitter awarded primarily for contact with airport traffic control towers. One of the smallest transmitters ever constructed for aircraft use, the new unit contains two tubes, an 6X2 and an 6X5. Two crystal-controlled frequencies of 300 and 310 mc. are provided. Maximum modulation percentage is 100 percent. A plate-circuit milliammeter (150 ma. 500 scale) gives a visual indication of transmitter operation.

The system measures 7 by 236 by 236 inches, and contains a variable power supply (300 amps drawn at 12 volts or 7 amps drawn at 6 volts) connected directly with the transmitter. If desired, the power supply and transmitter may be obtained in separate mountings, permitting the power supply to be placed into the battery to avoid voltage loss in the leads. The controls include a power switch, filament switch, age switch and microphone jack, all of which are available from the front panel. A high-pass microphone and all necessary cables are supplied with the transmitter.

**TISSOT 840**  
(Continued from page 41)

Livestock and poultry: 46 cwt.  
 Max. rain water: 35 in.  
 Max. rain gauge: 65 in.  
 Normal number of years: six.  
 Weight energy: 1,200 lb.  
 Abundance for sales, farms, etc.: 121 lb.  
 World food: 2,287 lb.  
 Food: 180 gal.  
 Oil: 19 gal.  
 Haystack: 198 lb.  
 Seed: 300 lb.

Gross weight: 7,800 lb.  
Wing loading: 36.1 lb. per sq. ft.  
Power: 1,600 hp.  
Power plant: (2) Pratt & Whitney  
Turboprop 1,600 hp. at 2,200 r.p.m.  
at 1,400 ft. altitude; 400 hp. at 2,200  
r.p.m. for climb.  
Propulsion: Allison Standard owners

Maximum speed: 256 mph, critical altitude, 257 mph.  
Cruising speed: 125% power, 134 mph at 1,000 ft., 50% power, 180 mph at 5,000 ft. at 2,500 rpm.

Staking speed without flag: 20 mph.  
 Landing speed on land: 59.5 mph.  
 Landing run with hook: 225 ft.  
 Takeoff distance with flag: 200 ft.  
 Takeoff time with flag: 10 sec.  
 Initial rate of climb: 1,200 ft. per min.  
 Time to 3,000 ft.: 2.5 min.

Time to 10,000 ft. 7.5 min.  
Absolute ceiling 2 engines 26,200 ft.  
1 engine 14,800 ft.  
Endurance, at max. speed, 243 hr. 1 engine  
71% power 10.5 hr., at 50% power 4.0 hr.

Range of max. speed, 300 mi., at 75% power 700 mi.; at 50% power 700 mi.  
Fuel consumption max. speed, 24 gal. per hr.; at 75% power 49.5 gal. per hr.; at 50% power 42.5 gal. per hr.

Equipment includes: Altimeter, turn and bank indicator, rate of climb indicator, compass, airspeed indicator, 2 manifold pressure gauges, 2 electric tachometers, 1 engine cylinder temperature gauge, 1 oil burner air temperature gauge, 2 engine air temp. units.

**Electrical equipment:** one Reading bar meter, one Edison incandescent lamp, two 5 & 10 reading lamps, heating light (100w), one oil stabilized light, one solar dome light, one lantern light, one voltmeter, one Stralida guitar switch.

**Power Plant:** One turbo engine type as per owner, two Ford fuel pumps, two exhaust collector rings, two oil coolers, two Hamilton-Standard centrifugal propellers (constant speed units).

**Maculotheca**—One half for extra gamete; one first and last, one every such unit, one set body, one big hook and constant complete larynx, provide for two-way state, two 2 side. Ratio: 1:2. Lay five endogametes in larynx and discharge pipe in each nestle, complete side standing of embryo, but bearing on all contents.



to David Allen

*Congratulations*  
**H. D. INGALLS**  
*and*  
**AMERICAN AIRLINES**  
on AVIATION MAGAZINE'S AWARD  
For an Outstanding Contribution to Maintenance

H. D. Ingalls, Superintendent of Maintenance for American Airlines, was recently presented with Aviation Magazine's Maintenance Award, in recognition of an outstanding contribution to the field of maintenance of equipment in air transportation.

American Airlines, flying approximately 50,000 miles each day over 7,000 miles of air routes.

new Wright Cyclone engines to power all of its new fleet of 14-passenger Douglas DC-2 Day Planes, 11-passenger Douglas DC-3 "Flagship" Club Planes, and 14-seat "Flagship" Skycoasters.

Congratulations to you, Mr. Ingalls, and to your able assistants, L. W. Pomeroy and Paul O'Neil, and all other members of your efficient, smooth-functioning organization.

<sup>10</sup>“Fly B’ach B’right like B’ach’s Dove”

**WRIGHT**  
AERONAUTICAL CORPORATION  
PATTERSON NEW JERSEY

A. *extremus* and *intermedius* represent common factors



## Guides to Operating Efficiency at AMERICAN AIRLINES



**FORMICA**

These pulleys weigh about half as much as those made of light metal. Constant shedding under Army and Navy special release means million miles.

FORMICA control pulleys and helioid bushings may be little things . . . but their insulating performance and lightness contributed a share to American Airlines' winning of the coveted Aviation Magazine Maintenance Award.

Nearly every American Airlines ship is equipped with these products when delivered. Naturally, during routine replacements, their past performance makes Formica the only choice.

The FORMICA INSULATION Company  
4538 Spring Grove Ave. Chicago, Ill.

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**AVIATION MAINTENANCE AWARD**  
Presented to the Corporation of the B. G. for the maintenance of the B. G. Corporation's fleet of aircraft during the year 1937.

**AMERICAN AIRLINES, INC.**  
300 WEST 33rd STREET  
CHICAGO  
March 16, 1938

The B. G. Corporation  
156 West 33rd Street  
New York City, N. Y.

Gentlemen:

We congratulate you on the performance of B. G. spark plugs in all types of engines operated by American Airlines.

Both your product and personnel have played an important part in helping to win for American Airlines the Aviation Maintenance Award for 1937.

Very truly yours,  
*H. D. Ingalls*  
H. D. INGALLS  
Superintendent of Maintenance

**AMERICAN AIRLINES, INC.**

**BG**

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Consultants to the United States Army and Navy and Aircraft Engine Builders  
126 WEST 33rd STREET, NEW YORK, NEW YORK

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## "After Extensive Tests of Several Types of Floor Cleaners, we use Magnus Cement Cleaner 100% in American Airline Shops."

H. D. INGALLS,  
Supt. of Maintenance

Magnus Chemical Company congratulates Mr. Ingalls upon receiving the American Maintenance Award. Naturally, we are proud that he uses MAGNUS CEMENT CLEANER 100% in all American Airline Shops.

We believe this is because he has found, as you would find, that MAGNUS CEMENT CLEANER cleans, whitens and lustrates floors, prevents decomposition and eliminates staining. Magnus cleansed marbles and floors have long appeal to persons, and maximum wooden floors covered by grime, only slippery floors.

For thorough cleaning of aluminum and steel motor parts, MAGNUS AVIATION CLEANER cleans quickly and safely, with great savings in time. For complete removal of oil, kerosene, exhaust, traffic film and stains from wings and fuselages, MAGNUS AVOCLEAN is best on surfaces and work-out alike. It leaves a clean, polished gloss that actually increases speed and saves fuel through decreased wind-resistance.

Send to our Technical Department for a wealth of FREE information on cleaning operations in the maintenance and repair of aircraft.

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When General Cleaners use a Magnus floor cleaner, the floor is spotless.



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Superintendent of  
Maintenance for  
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Inc.

★ ★ ★



...on placing the award as "BEST OVERHAULING MAN IN MAINTENANCE WOOD DESIGN 1937" awarded by the Air Transport Association of America. We pride with pride in the fact that Mr. Ingalls is a resident user of Haskelite Aircraft Products... a prime factor which has these products continue up to the most exacting qualifications of air transport service.

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HASKELITE MANUFACTURING CORP.

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Offices in Detroit, New York, San Francisco

## For dependable results in electrical installation and maintenance work...

### PUT IT UP TO CRESCENT

Consistent electrical contracting equipment and experts and have been a wide experience in every part of work having covered them under "Best Electrical Equipment" for more than 13 years.

We have received the American Airline Award since Mr. Ingalls has been awarded with this company.

We take pleasure in congratulating Mr. Ingalls on winning the 1937 "Best Electrical Equipment Award for 1937."

Write us for information regarding the electrical installation and servicing of your shop.



H. D. Ingalls  
Superintendent of  
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| ACA Division | ACA Division        | Radio |
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April 1938

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# Pioneer

## NEW APERIODIC COMPASS

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Leading aviation experts who have tested and accepted this compass agree that it represents a distinct advance in air navigation. It has no parallel error, the card is exceptionally steady and completely immune from error has been practically eliminated. Indirect electric illumination without glare, a positive setting and locking device and universal compass rose have been provided.

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WACO MODEL N

"LETS THE YOUNG FLY ROOSTER"

"AND THE OLD FLY LONGER"

## SAFETY...

### WITHOUT COMPROMISING PERFORMANCE

Designed primarily as the safest sedate-type airplane for novice or veteran pilot, the three-wheeled Waco N forfeits none of the speed and comfort that are traditional Waco characteristics. At altitude, it cruises at 148 miles an hour . . . yet its unique design permits safe landings in clearings far too small to accommodate even much lighter ships. Ground-loop and nose-over are impossible. And because of its level flight position when on the ground, all-around visibility is perfect at all times. See your local dealer, or write direct for complete information. Terms are available on all models.

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1934 MODEL C CAMEL—  
 beautifully finished—built  
 for it or it grows old  
 together—also available  
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1934 MODEL E CAMEL—  
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SAFETY TO THE NTH DEGREE • LUXURIOUS COMFORT • OUTSTANDING PERFORMANCE





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Aircraft Cord is standard rigging for airplanes on a majority of the nation's planes.

Roebbing Wire Aircraft Products are made in Sweden, England and High Capacity (Control or Emergency) Steel, Wire or Cable Aircraft Wire, Aircraft Insulation, Aircraft Cord (1/4", 3/8", 1/2", 5/8", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 3 1/2", 4", 5", 6", 8", 10", 12", 14", 16", 18", 20", 22", 24", 26", 28", 30", 32", 34", 36", 38", 40", 42", 44", 46", 48", 50", 52", 54", 56", 58", 60", 62", 64", 66", 68", 70", 72", 74", 76", 78", 80", 82", 84", 86", 88", 90", 92", 94", 96", 98", 100").

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THE NEW VALUE IN AIRCRAFT



• The Dart Manufacturing Corporation takes pleasure in announcing the Model G.

A low-wing, full cantilever monoplane of an original design, new in beauty, in operating ease and safety . . . every factor of its practical, sensible design inspires confidence and ensures long life and satisfaction.

Two-place seating, powered with a 50 hp. Lycoming engine, type R266, providing a top speed of 150 m.p.h. and cruising speed of 110 m.p.h. Priced in the medium class.

Insights selected from plane owners, powerful "flyers" and distributors.

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THE DART MANUFACTURING CORP.

FORT COLUMBUS • COLUMBUS, OHIO

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April 1937

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## SHELBY WINS PLACE IN

# Record-breaking Transports



**THE** story of the new Pan American Clippers, now under construction by Boeing, is a story of superlatives. For these six giants of the airways will far transcend in magnitude anything that has heretofore been attempted in heavier-than-air craft.

Spreading 152 feet from tip to tip, these ships, the first low-winged transports, will carry gross weights up to 82,500 pounds. Their speed will range up to 200 mph, and cruising radius will approach 5000 miles. They will provide maximum accommodations for 70 daytime passengers, an upper and lower berth for 40 passengers at night.

Naturally, for craft of such record-breaking proportions, the transportation could follow no procedure to carry stage of development they had to establish their own standards. Seattle Seacraft was its place in the hull, wing, open, and crew members.

Seattle Seacraft Aircraft Taking, long a standard with leading aircraft builders, has long up an admirable record for consistent quality, its high



**CENTRAL TUBE AND GIRDERS**—With new standard, the tubular design and welded joints of the new Seacraft (Shelby) is no longer for aircraft construction.

**CENTRAL TUBE AND GIRDERS**—The new Seacraft (Shelby) is no longer for aircraft construction.

strength-weight ratio, and its adaptability to all modern fabrication methods were important factors in the adoption of the tubular framework. Add to that the fact that it can be obtained in various shapes, wall thicknesses, and grades of steel—exactly, as you need it—and you have the tubing that helps make aircraft construction a more exact science — Seattle Seacraft's.

"Good tubing is also available in Seacraft's 'E' tubing, which has an improved light weight finish."

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*"World's largest holder of commercial and military aircraft"*

DOUGLAS

DOUGLAS AIRCRAFT CO., INC. 

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April, 1937  
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At the first take-off—  
**SHELL POWERED**  
**SHELL LUBRICATED**



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A YEAR HAS BEARED into view in the Aviation industry during the past year. Over 400 Taylor-crafts are proving, here and abroad, that flying can be brought within the reach of all.

It is significant that these popular-priced planes leave the factory completely lubricated with Shell Aviation Lubricants and powered by Shell Aviation Fuels.

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Continual research, pioneering experiments and unending tests under all conditions, good and bad, have brought Shell Aviation Products to a peak of perfection. Their greatest recommendations are the men who put their dependence in them.



AVIATION  
 April, 1937  
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The New  
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**Continental Motors Corporation**  
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To Mr. H. D. Ingalls of  
American Airlines, Inc.

Our congratulations for receiving  
the Maintenance Award  
of *American Magazine* for 1937.



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FLUCTUATIONS... new design  
assures higher accuracy even under wide  
voltage changes, without the aid of regulation. Sudden voltage drops caused by  
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WESTON quick-change plug connectors  
permit quick, simple installation, as  
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### AVIATION INSURANCE

It is just as true of insurance as it is of anything else you buy—you get what you pay for.

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**AVIATION "CLASSIFIED"**

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### Aircraft Magnetos

are "working" for every  
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**FLY north, south, east, west—**  
in any climate place and you'll find Bendix-Scintilla Aircraft Magnetos. For these are essential magnetos on standard aviation equipment of every airline in America! This is significant—for airlines choose with no-hesitation care every product in their planes. They must "measure up" to be accepted.

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## PESCO

### Aircraft Products

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Note the comparison of the units. Common and Tuning Units are recorded on the scales directly below the Amplifier Unit, thereby obviating the tedious task of weighing and counting. Note particularly the correct methods

The specially designed, high efficiency loop provides three types of reception: three types of direction finding. Bearings may be taken and reception obtained in 300 KC, important for emergency flying. Frequency range 300 KC to 2000 KC.

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Today, 475,000,000 passenger miles annually are safely flown by aircraft built largely of Alcoa Aluminum Alloys, powered by engines made lighter and more efficient by Alcoa Aluminum. The success results from a double proving, which our product undergoes. The thousand checks in the right shows one phase of this work — rigid X-ray examination of an aircraft cylinder head.



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Type E-160 Direct Cranking Electric Starter with integral hand cranking available for 12-volt operation on engines up to approximately 800 H.P. and for 24-volt operation on engines up to approximately 1,000 H.P.



Type E-80 Direct Cranking Electric Starter available for 12-volt operation on engines up to approximately 250 H.P.



LEFT: M-3281-A Cartridge Starter for use on engines up to approximately 1,000 H.P.



RIGHT: Type Y-150 Direct Cranking Electric Starter available for 12-volt operation on engines up to approximately 150 H.P.

★ ★